

HOW DO LIVING THINGS' BODIES HELP THEM MEET THEIR NEEDS?

UNIT 7: Your Environment
Lesson 16 — Grade 4-5
INSTRUCTIONS



Overview

In this lesson students will investigate animal adaptations by using a variety of tools to represent different bird beaks.

Objectives

On successful completion of this lesson, students will be able to:

- Name the four basic needs of all animals;
- Explain how an animal's adaptations help it meet its basic needs;
- Give one example of an adaptation of a local animal; and
- Sort birds into groups based on type of beak.

Alaska Standards

Alaska Science Standards / Grade Level Expectations

- [4, 5] SA1.1 The student demonstrates an understanding of the processes of science by asking questions, predicting, observing, describing, measuring, classifying, making generalizations, inferring and communicating.
- [4] SA1.2 The student demonstrates an understanding of the processes of science by observing, measuring, and collecting data from explorations and using this information to classify, predict and communicate.
- [4] SC1.1 The student demonstrates an understanding of how science explains changes in life forms over time, including genetics, heredity, the process of natural selection, and biological evolution, by showing the relationship between physical characteristics of Alaskan organisms and the environment in which they live.
- [4] SC2.2 The student demonstrates an understanding of the structure, function, behavior, development, life cycles, and diversity of living organisms by describing the basic characteristics and requirements of living things.
- [5] SA1.2 The student demonstrates an understanding of the processes of science by using quantitative and qualitative observations to create inferences and predictions.
- [5] SC2.1 The student demonstrates an understanding of the structure, function, behavior, development, life cycles, and diversity of living organisms by identifying and sorting animals into groups using basic external and internal features.

Alaska Cultural Standards

[E] Culturally- knowledgeable students demonstrate an awareness and appreciation of the relationships and processes of interaction of all elements in the world around them. Students who meet this cultural standard are able to:

- [E2] understand the ecology and geography of the bioregion they inhabit.



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Bering Strait School District Scope & Sequence

4th Grade Sequence #4 Living Things Animals

A. Describe the basic characteristics and requirements of living things.

I. Use scientific processes and inquiry to directly support concepts on animals.

5th Grade Sequence #5 Living Things Animals

B. Identify and sort animals into groups using basic external and internal features.

F. Use scientific processes and inquiry to directly support concepts on animals.

Materials

- Pair of chopsticks (one per group)
- Hairpin - spring type (one per group)
- Salad tongs (one per group)
- Scissors (one per group)
- Tweezers (one per group)
- Small pliers (one per group)
- Large, locking pliers (one per group)
- Aluminum pie plate (three)
- Play-Doh (one container)
- Crinkly cat toys (three)
- Small plastic tub (one per group, no water)
- Small plastic tub filled with water (one)
- Sponges (two, cut into smaller pieces)
- Napkins (one per student)
- Plastic pint glass (one)
- Straws (one per student)
- Rice (one cup)
- Sunflower seeds – in the shell (one cup)
- Koosh balls (three)
- Plastic cups – 18oz (one per student)
- STATION CARDS (seven)
- STUDENT WORKSHEET (one per student)
- BIRD CARDS (one set per student)
- FOOD CARDS (one set per student)



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Multimedia

REACH Multimedia 4-6: "How Do Plants and Animals Adapt?"
Available at: www.k12reach.org

Additional Resources

HSP IV; Ch. 3, Lesson 1

Activity Preparations

1. Read through the entire lesson, including the teacher background information in the Whole Picture section.
2. If needed, make copies of the STUDENT WORKSHEET (one per student). Or, have students create their own Observation Chart in their science journals, as shown on page 128 of the HSP IV student edition. If necessary, make additional copies of the STATION CARDS, BIRD CARDS and FOOD CARDS; you can have students cut them out.
3. Set up seven stations around the room with STATION CARDS. For food:
 - a. At Station 1, put out several golf ball-sized clumps of Play-Doh on an aluminum pie plate.
 - b. At Station 2, set out the crinkly cat toys.
 - c. At Station 3, set out the plastic tub and fill it halfway with water. Put the sponges in the water. Set out the napkins at this station.
 - d. At Station 4, put straws in the plastic pint glass (no water).
 - e. At Station 5, spread the rice out on an aluminum pie plate.
 - f. At Station 6, spread the sunflower seeds out on an aluminum pie plate.
 - g. At Station 7, set out the Koosh balls.

Whole Picture

The animals that inhabit the Bering Strait region are uniquely adapted for its harsh weather. Most animals deal with the extreme temperatures through behavioral adaptations, either migration or hibernation; Lesson 17 "How Do Living Things' Behaviors Help them Meet their Needs?" addresses behavioral adaptations. Animals also have physical adaptations for the cold, such as, the insulating layer of fat boasted by marine mammals including whales, seals, and walruses.

Walruses are well known for another physical adaptation: their tusks. Both males and females have tusks that can be used for defense and for hauling out on to the sea ice. Walruses hunt in shallow waters; their prey are bottom dwelling invertebrates. They use their broad, flat muzzles to brush the sea floor looking for food. Major food items include several different kinds of clams, of which, only the fleshy parts are eaten. It is believed that these parts are torn away from the rest of the clam by strong suction, a method of feeding for which the mouth of the walrus is



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ideally designed. The mouth of a walrus is “narrow, with an unusually high roof, strong thick lips which are not deeply cleft along the side of the face (the gape is extremely limited), and a thick piston-like tongue” (Burns 1994). To take breaks from all the swimming they do while feeding, walrus use their tusks to pull themselves onto the sea ice to rest. So, it follows that disappearing sea ice affects the way they live and survive.

Walrus in Alaska made national headlines in September 2014, when large groups were photographed in the National Oceanic Atmospheric Administration (NOAA) annual arctic marine mammal aerial survey. According to NOAA, “nearly 35,000 walrus were discovered... on a northwest Alaskan shore as result of being unable to find sea ice to rest upon, a problem aggravated by climate change” (Linshi 2014).

Savoonga is known as the “walrus capital of the world”. With the changes in sea ice, hunters have to travel further to hunt walrus and other marine mammals. Kenneth Kingeekuk related, “We never used to go out too far when we’d go walrus hunting... five, six, seven miles out and we’d come back and unload our skin boats and go back out again for another trip... But nowadays we have to go a hundred-plus miles to get our prey, walrus or bearded seals or other marine mammals out there.” Other hunters interviewed for the Aksik documentaries also commented on the way sea ice melt has impacted hunting. Traveling farther out in the ocean is more dangerous, and sometimes on the return trip game meat must be thrown overboard to save weight. Also, they spend more money on gasoline to travel farther (Kingeekuk 2010).

As climate changes and some animals relocate out of the area, new animals, more suited to the changed conditions, also move in to the area. Perry Pungowiyi recounted the story of a young boy who saw a snowshoe hare and told his uncles (who initially said, “there’s no rabbits around here”). When it turned out the boy was right, they were “excited to see that snowshoe hare, they’d never seen one before” (Pungowiyi 2010).

Hunting is a very important part of Alaska Native culture. It is important for hunters to make careful observations about which species are increasing in population and which are declining in the area. It is also important for hunters to know about the habitats and adaptations of their prey. Students may be particularly interested in birds, especially shorebirds; it is traditional for young people to hunt birds with pellet guns and bring them home to their parents and grandparents to cook (BSSD 2011).

As highlighted in the lesson activity, birds’ beaks are tailored to their niche in the ecosystem. Diving birds, such as loons and grebes, hunt by spotting fish underwater and stabbing or grabbing it with their long beaks. Shorebirds, such as plovers and sandpipers, also have long beaks; but they do their hunting by feel, wading along and using their beaks to probe the mud for invertebrates. Ducks have beaks that work as strainers, allowing them to scoop mouthfuls and let the water drain out while they eat the plants or small invertebrates they find. Ptarmigan have sharp beaks that allow them to browse, nipping off buds and berries as they walk by. Amongst songbirds, some species have seed-based diets while others specialize on insects. Seed-eaters have a more conical-shaped bill to help them crush seeds. It should be noted that almost all birds feed insects to their babies as a protein source, even if they are herbivores as adults. Ravens belong to the same taxonomical group as songbirds, a group called the Passerines. Ravens are notorious scavengers, with large, sharp beaks. Ravens can prey on small



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animals, but mostly eat garbage and carrion (animals that are already dead). Since they are frequently “stealing” their meal, it makes sense that they have a large beak for carrying away the food they take from humans or animals.

Vocabulary

organism – A living thing

basic needs – Food, water, air, and shelter that an organism needs to survive

adaptation – A body part or behavior that helps an organism survive

habitat – An area where an organism can find everything it needs to survive

Activity Procedure

This activity is modified from the “Investigate: Eating Like a Bird” activity at the beginning of Chapter 4, Lesson 1 in the 4th grade edition of HSP.

1. Begin by reviewing the four basic needs all animals have: food, water, air, and shelter. You can reinforce the concepts of habitat and basic needs with a little song, to the tune of “The Farmer in the Dell”:

*A habitat's a home
A habitat's a home
Food, water, shelter, air
A habitat's a home*

2. Lead a class discussion about how animals’ adaptations help them meet their basic needs for survival. Ask students for examples, providing your own to get them started. A non-local example could be that a giraffe has a long neck, which allows it to eat leaves high up in trees. Bringing that concept closer to home, ask: why do whales and seals have a layer of blubber? To keep them warm in cold ocean water! Do the students know that birds have hollow bones? Ask them to think about why that is an important adaptation for birds to survive.
3. Explain that in the activity, they will be investigating how birds’ beaks are suited for their preferred food, by pretending that the tools are beaks and the items are the bird’s food. The “Answers” section has information about how the tools can represent the beaks of various bird species, but do not share this information with the students beforehand. Give each student a cup and a STUDENT WORKSHEET. Divide students into groups and give directions for rotating through stations. Give each group a set of the seven tools and a plastic tub for safely carrying the tools. Prep students with safety reminders regarding the tools they will use, such as pliers and scissors. At each station, they should experiment with the various tools to see which tool works best for transferring the “food” item into their cup. Instruct students to each record their own observations on their Observation Chart.



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4. When all students have completed the seven stations, discuss their observations about the tools and objects. Which local birds and food sources could they represent?
5. Group students into pairs and a set of the BIRD CARDS and FOOD CARDS. Ask them to make predictions about what the birds eat and what kind of habitat the birds live in. Instruct students to spread out their seven FOOD CARDS, and to then sort the BIRD CARDS into corresponding groups based on their predictions. Check their groupings to see if they show understanding of the relationship between the shape of the beaks and the birds' food source. See the "Answers" section for ideas on leading the closing discussion. Though many of these birds can eat a variety of food, depending on what is available, these groupings show what is representative of their typical diet.

Extension Activities

- Read "Beaks!" by Sneed B. Collard III
- "Build a Shorebird" activity from Arctic-Nesting Shorebirds curriculum by U.S. Fish and Wildlife Service. Accessed at: <http://eric.ed.gov/?id=ED427955>

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Answers

Do not become too focused on matching each tool to a specific type of bird or each object to a specific type of food. For example, students may observe that the tweezers work well for picking up most objects. This is fine; in nature, some animals are generalists and some are specialists. Emphasize that the beaks are an adaptation for the birds' preferred food.

Your students may be able to relate this activity to local examples of birds on their own. You can also guide them to recognize some general parallels.

- Chopsticks – Can be used to stab the Play-Doh, the way a loon stabs fish.
- Hairpin – Can be used to grab the cat toy to simulate shorebirds probing the mud for invertebrates, such as worms and small crabs. Local examples of shorebirds include plovers and sandpipers.
- Salad tongs – Can be used to pick up the sponges and let the excess water drain away, like a duck or a goose straining vegetation and invertebrates from mouthfuls of water. Local examples include Northern Pintails, Green-winged Teals, and Emperor Geese.
- Scissors – Can be used to cut the straws, the way a ptarmigan nips berries and buds off of shrubs.
- Tweezers – Can be used to pick up grains of rice, the way songbirds, such as sparrows, grab insects with their chisel-shaped beaks.
- Small pliers – Can be used to crush the sunflower seeds, to simulate the conical-shaped beak of a songbird such as a Snow Bunting, cracking open seeds.
- Large pliers – Can be used to carry the Koosh ball, to illustrate that ravens are scavengers and use their beaks to carry a variety of food from place to place. Explain that ravens are opportunistic feeders. Ravens can prey on small animals, but mostly eat garbage and carrion (animals that are already dead). Since they are frequently “stealing” their meal, it makes sense that they have a large beak for carrying away the food they take from humans or animals.

Card Sorting Activity:

- Fish – Divers: Common Loon, Red-necked Grebe
- Invertebrates – Shorebirds: Western Sandpiper, Pacific Golden-Plover, Red-necked Phalarope, Dunlin, Bar-tailed Godwit, Black Turnstone, Long-billed Dowitcher, Wilson's Snipe
- Aquatic Plants – Waterfowl: Canada Goose, Tundra Swan, Green-winged Teal, Spectacled Eider, Emperor Goose
- Willow Buds – Grouse (“wild chicken”): Willow Ptarmigan, Spruce Grouse
- Insects – Songbirds (insect-eaters): Lapland Longspur, White-crowned Sparrow, Arctic Warbler
- Seeds – Songbirds (seed-eaters): Common Redpoll, Snow Bunting
- Almost Anything – Common Raven



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Student Worksheet: Observation Chart

Name _____

Station #	Object (Food)	Best Tool (Beak)	Observations
1			
2			
3			
4			
5			
6			
7			



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STATION #1

Which tool works best for putting the objects into your cup?

You may use the tools to pick up the Play-Doh balls OR stab them.

STATION #2

Which tool works best for putting the objects into your cup?

What if you had to squash the cat toys?

STATION #3

Which tool works best for putting the objects into your cup?

Try to get the sponges without getting a lot of water. Be sure to clean up any water mess before you leave this station.



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STATION #4

Which tool works best for putting the objects into your cup?

Collect bite-size pieces of the straw into your cup, not the whole straw!

STATION #5

Which tool works best for putting the objects into your cup?

Try to get individual grains of rice, one at a time.

STATION #6

Which tool works best for putting the objects into your cup?

What if you had to crush the sunflower seeds to break them open?

STATION #7

Which tool works best for putting the objects into your cup?

What if you had to carry the Koosh ball across the room?



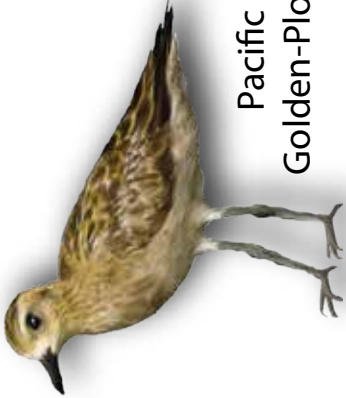







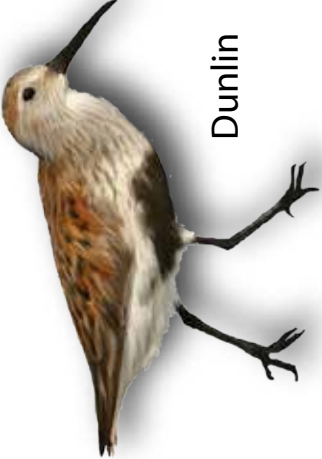
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 <p>Lapland Longspur</p>	 <p>Common Loon</p>	 <p>Spectacled Eider</p>
 <p>Raven</p>	 <p>Spruce Grouse</p>	 <p>White-Crowned Sparrow</p>
 <p>Common Redpoll</p>	 <p>Ptarmigan</p>	 <p>Wilson's Snipe</p>



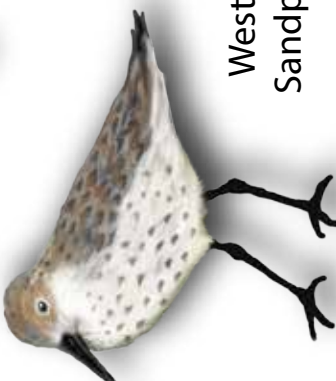


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 <p>Pacific Golden-Plover</p>	 <p>Emperor Goose</p>	 <p>Black Turnstone</p>
 <p>Red-necked Phalarope</p>	 <p>Green-winged Teal</p>	 <p>Canada Goose</p>
 <p>Snow Bunting</p>	 <p>Long-billed Dowitcher</p>	 <p>Dunlin</p>

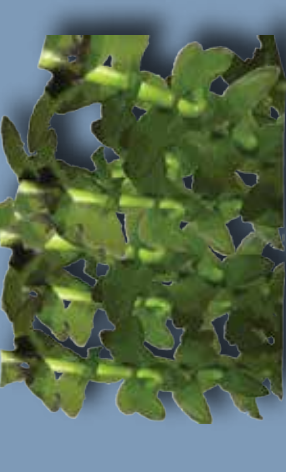

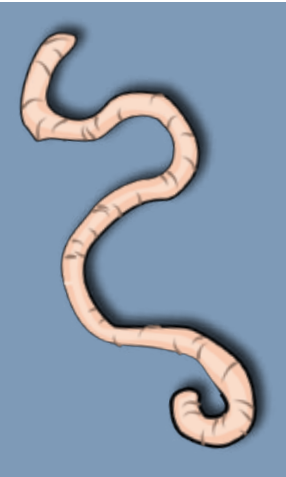

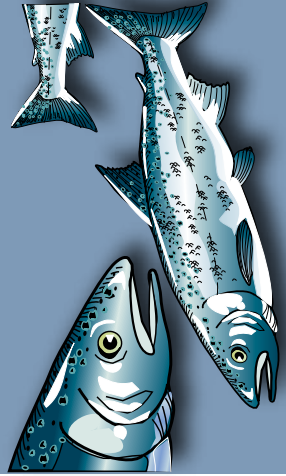

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<p>Tundra Swan</p> 		
<p>Arctic Warbler</p> 	<p>Western Sandpiper</p> 	
<p>Bar-tailed Godwit</p> 	<p>Red-necked Grebe</p> 	

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<p>Aquatic Plants</p> 	<p>Insects</p> 	
<p>Invertebrates</p> 	<p>Seeds</p> 	
<p>Fish</p> 	<p>Willow Buds</p> 	<p>Almost anything</p> 